A Practical Approach of Efficient Resources Allocation by Reducing Time Delay in Grid Computing

Gaurav
Department of Computer Science and Engineering
MITM, Jevra, Haryana, India

Rishi
Department of Computer Science and Engineering
MITM, Jevra, Haryana, India

Abstract - Grid computing is applying the resources of many computers in a network to a single problem at the same time - usually to a scientific or technical problem that requires a great number of computer processing cycles or access to large amounts of data. The scheduling algorithms are the core part of the grid computing which allocates the resources to the particular processor accordingly to the situation and requirement. This paper proposed the Grid Resources allocation using Shortest Job First Algorithm with the concept of History of Resources. If the particular task has been completed earlier, then same task will not be processed again. The resources will be scheduled accordingly and Time Delay will be reduced.

Keywords: Grid Computing, Shortest Job First, Resources, Time Delay

I. INTRODUCTION

Grid computing requires the use of software that can divide and farm out pieces of a program to as many as several thousand computers. Grid computing can be thought of as distributed and large-scale cluster computing and as a form of network-distributed parallel processing. It can be confined to the network of computer workstations within a corporation or it can be a public collaboration. Grid computing is a service for sharing computer power and data storage capacity over the Internet.

Need of Grid Concept

a. A biochemist exploits 10, 000 computers to screen 100,000 compounds in an hour.
b. 1,000 physicists worldwide pool resources for peta-op analyses of petabytes of data.
c. Civil engineers collaborate to design, execute, & analyze shake table experiments.
d. Climate scientists visualize, annotate, & analyze terabyte simulation datasets.
e. An emergency response team couples real time data, weather modeland population data.
f. A multidisciplinary analysis in aerospace couples code and data in four companies.
g. A home user invokes architectural design functions at an application service provider.
h. Scientists working for a multinational soap company design a new product.
i. A community group pools members PCs to analyze alternative designs for a local road.

Scheduling in Grid

The conventional resource management schemes are based on relatively static model that have centralized controller that manages jobs and resources accordingly. These management strategies might work well in those scheduling regimes where resources and tasks are relatively static and dedicated. However, this fails to work efficiently in many heterogeneous and dynamic system domains like Grid where jobs need to be executed by computing resources, and the requirement of these resources is difficult to predict. The complex, heterogeneous and dynamic systems present new challenges in resource management such as: scalability, adaptability, reliability and fault tolerance.

Shortest-Job-First (SJF) is a non-preemptive discipline in which waiting job (or process) with the smallest estimated run-time-to-completion is run next. In other words, when CPU is available, it is assigned to the process

that has smallest next CPU burst. The SJF scheduling is especially appropriate for batch jobs for which the run times are known in advance. Since the SJF scheduling algorithm gives the minimum average time for a given set of processes, it is probably optimal. The SJF algorithm favors short jobs (or processors) at the expense of longer ones.

II. LITERATURE REVIEW

Mehdi Bahrami (2010) introduce networks by militaryC4ISR (Command, Control, Communications, Computers and Intelligence, Surveillance, & Reconnaissance) architecture. We discuss Self-* property of autonomic grid computing networks in autonomic grid computing networks can lead and manage by C4ISR architecture because we found many held in common properties of autonomic grid computing networks and C4ISR discusses their properties. Finally, we introduce a new software architecture for self-* properties in autonomic grid computing networks as AGC4ISR. Then we introduce some application ofAGC4ISR architecture for many critical areas and how can use of it.

Inderpreet Chopra (2010) has discussed new paradigm of self-management through autonomic computing to pervade over the old manual system to begin the next generation of Grid computing. In this paper, they have discussed the basic concept of grid computing and the need for grid to be autonomic. A comparative analysis of different grid middleware has been provided to show the absence of autonomic behavior in current grid architecture. To conclude the discussion, they have mentioned the areas where research work has been lacking and what we believe the community should be considering.

NaidilaSadashiv (2010) presents an end-to end comparison between Cluster Computing, Grid Computing and Cloud Computing, along with the challenges they face. This could help in better understanding these models and to know how they differ from its related concepts, all in one go. It also discusses the ongoing projects and different applications that use these computing models as a platform for execution. An insight into some of the tools which can be used in the three computing models to design and develop applications is given. This could help in bringing out the innovative ideas in the field and can be explored to the needs in the computing world.

III. PROPOSED METHODOLOGY

The research work is to provide the algorithm which efficiently allocates the resources for completion the work without any time delay. The resources history will be recorded and would be useful for reusability. If the particular task has been completed by the resources, then it would not be computed again.

Problem Statement

Grid Computing means to manage the processes efficiently using algorithms and to reduce time delay. The work is to increase the success rate of job execution and to minimize the fairness deviation among resources and in this work we propose to achieve both this target simultaneously. The Decision should be taken at the time of assigning the processors to the task. The system should be efficient in terms of time delay and efficiently resource allocation. To do this, the following objectives have been finalized and implemented using MATLAB Simulation Tool.

1. To Analyses the Existing Grid Resources Allocation Process.
2. To Understand the Concept of the Starvation in Processes Allocation under Grid.
3. To Design an effective algorithm for reduce the time delay.
4. To develop an efficient job scheduling algorithm for resource allocation.
5. To implement the proposed algorithm to see the results outcome.
6. To Generate Results.

The proposed work has been implemented and history of the Processes, task has been created. As per the research work, processes will be assigned accordingly to the task using Shortest Job First Scheduling algorithm.

IV. RESULTS

The research work has been taken the four different processes in Grid Environment. The two processes has been shown in figures.

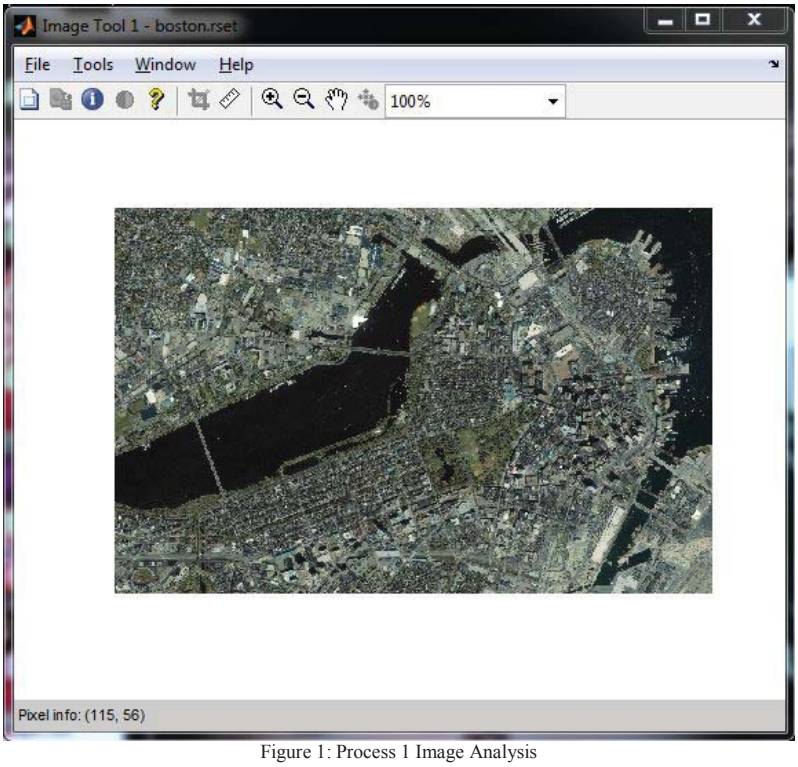

Figure 1: Process 1 Image Analysis

Figure 2: Process 2 Circle Drawing

The output before and after history has been shown in figures and shows the time delay.

P_ID	P_TIME	W_TIME	TA_TIME
3	0.01	0.00	0.01
2	0.19	0.01	0.20
1	0.98	0.20	1.18
4	2.00	1.18	3.18

Total Waiting Time:1.38
Average Waiting Time:0.35
Total Turn Around Time:4.56
Average Turn Around Time:1.14

Figure 3: Before History

P_ID	P_TIME	W_TIME	TA_TIME
3	0.05	0.00	0.05
2	0.10	0.05	0.15
1	0.90	0.15	1.05
4	2.00	1.05	3.05

Total Waiting Time:1.25
Average Waiting Time:0.31
Total Turn Around Time:4.30
Average Turn Around Time:1.08

Figure 4: After History

The history has been created shows in figure on which decision making depends.

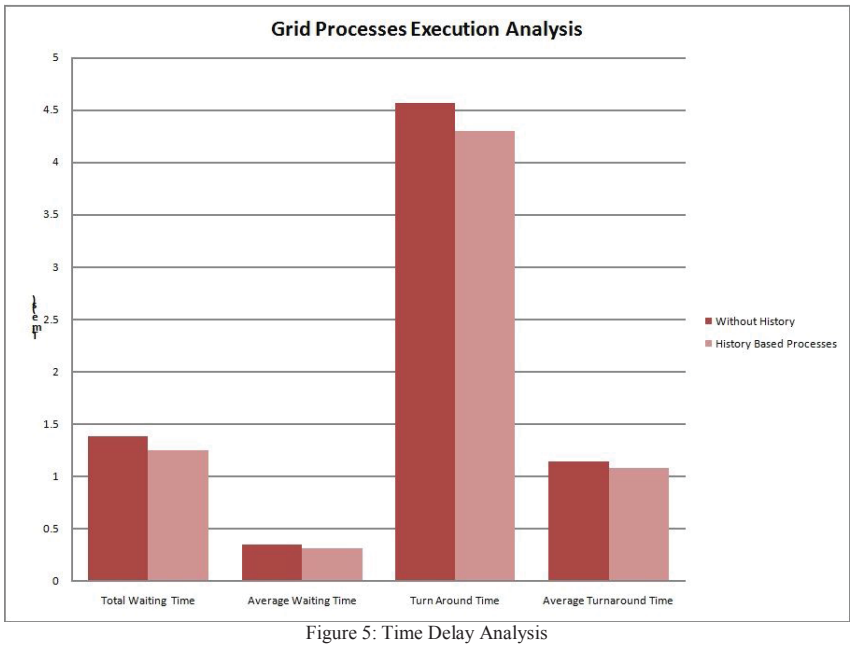

Figure 5: Time Delay Analysis

The Graphically time difference is explained in figure.

	1	2
1	1	1
2	2	20
3	3	1000
4	4	2

Figure 6: Processes History

V. CONCLUSION

The Research work has been implemented using MATLAB Simulation Tool for demonstrate the real working of the Shortest Job First Grid Algorithm and the processes using History based approach which means the resources will be allocate according to the task execution history. If the process has been executed earlier, then the resource will be free and can be allocate to the another task. The proposed work has been analyzed and has been efficient in terms of time delay. This also reduces the bandwidth, network transmission rate as this is the main aspect of the Grid Computing. The processes will be executed on time in multi layer Grid Environment.

REFERNCES

[1] Haller N., Metz C., Nasser P., and Straw M.(1998), "A One-Time Password System",RFC 2289, IETF, 1998.
[2] Inderpreet C. (2010), "Analyzing the need for Autonomic Behavior in Grid Computing", IEEE.
[3] Manoj Kumar M., RakshaS. (2010), "A Memory-Aware Dynamic JobScheduling Model in Grid Computing", 2010 International Conference On ComputerDesign and Applications (ICCDA 2010) IEEE.
[4] Mehdi B. and Ahmad F. (2010), "AGC4ISR, New Software Architecture forAutonomic Grid Computing", 2010 International Conference on Intelligent Systems, Modelling and Simulation IEEE.
[5] Peng Zhang Ming Chen Peng-ju He (2010), "The Study of interfacing Wireless SensorNetworks to Grid Computing based on Web Service", 2010 Second International Workshop on Education Technology and Computer Science, IEEE.
[6] Syed NasirMehmood S. et al. (2010),"Hybrid Resource Allocation Method for Grid Computing", Second InternationalConference on Computer Research and Development, IEEE.
[7] Zhen-chun H., Shi-feng S. (2010), "Design and Implementation of SCO-GADL– a Scientific Computing Oriented Grid Workflow", IEEE 2010.
[8] Andre Rigland, "Cloud Computing-How it is Different from Grid Computing". Trial lecturer in conjunction with PhD thesis defence.